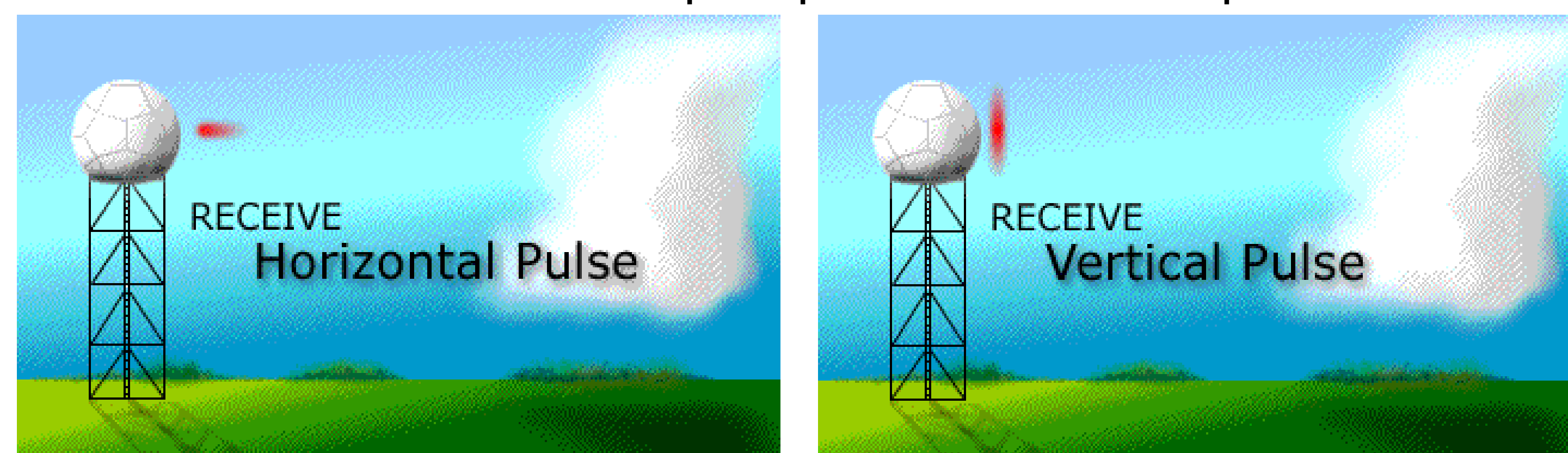


Dual-polarimetric Radar

Transmits and receives both horizontal and vertical signals.
More accurate estimate for precipitation and cloud particles.

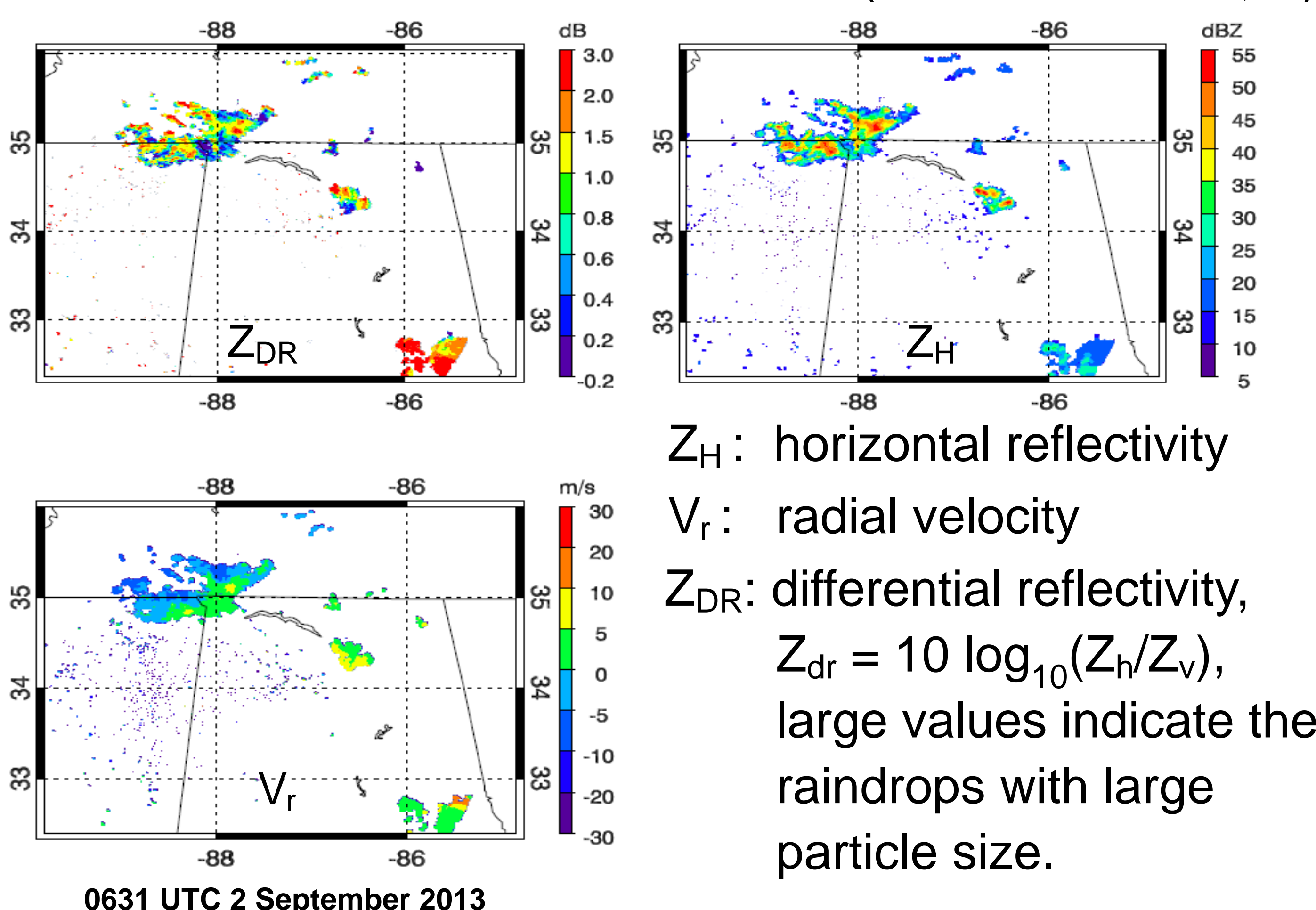


(From <http://cimms.ou.edu/~schuur/dualpol/>)

- NWS WSR-88D network has been entirely updated to include dual-polarimetric capability early last year.
- The dual-pol radar can provide more convective-scale information on cloud and precipitation particles.
- Assimilation of the dual-pol radar data is a relatively new area.
- Objective: demonstrate and compare impact of dual-pol radar data assimilation with GSI and WRFVAR.

Dual-polarimetric Radar Data & Assimilation Method

Dual-Polarimetric Radar Observation: NWS WSR-88D KGWX (Columbus Air Force Base, MS)



Model & Data Assimilation Package

WRF ARW V3.5.1

Community GSI v3.3

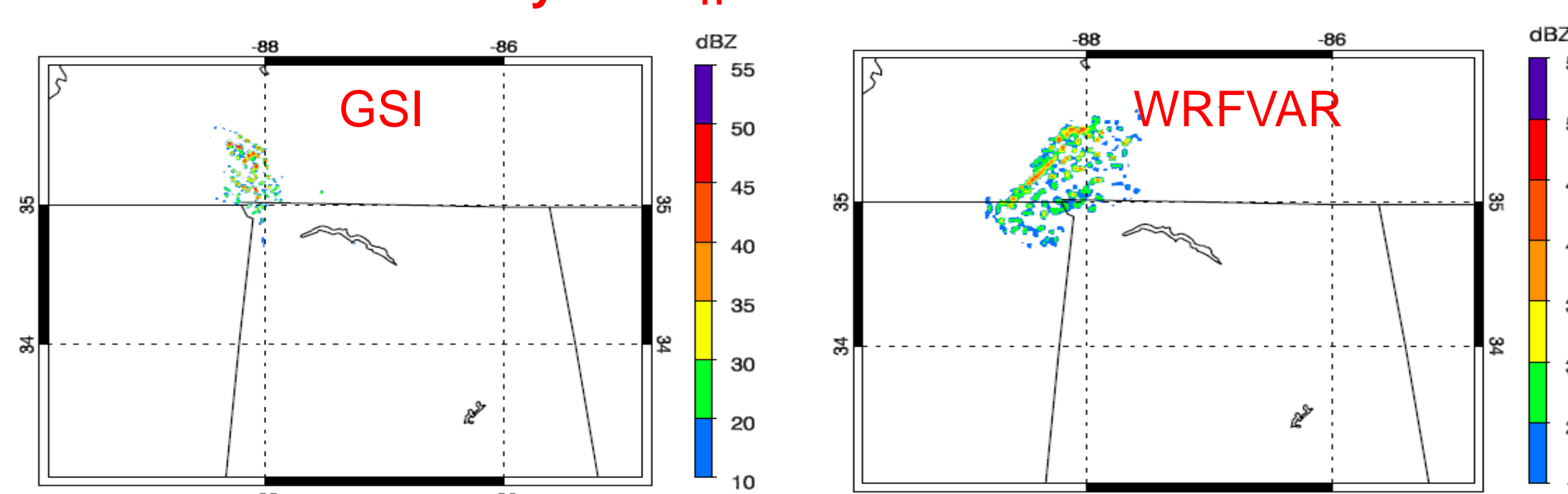
WRFDA V3.5.1

GSI: indirect assimilation of radar data using the Global System Division (GSD) cloud analysis and 3dvar
 WRFVAR: direct assimilation of radar data through 3dvar

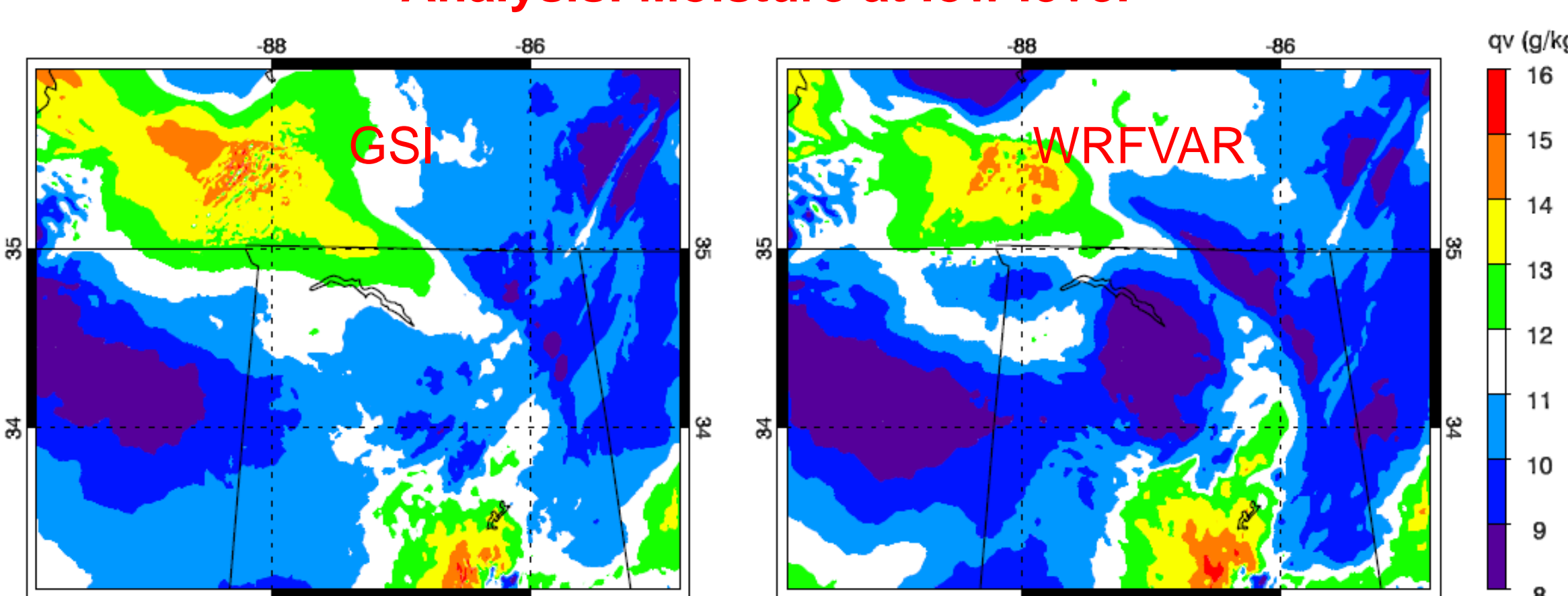
$$q_r = 1.28 \times 10^{-4} Z_H \cdot Z_{DR}^{-1.94}$$

Dual-polarimetric Radar Data Assimilation Result

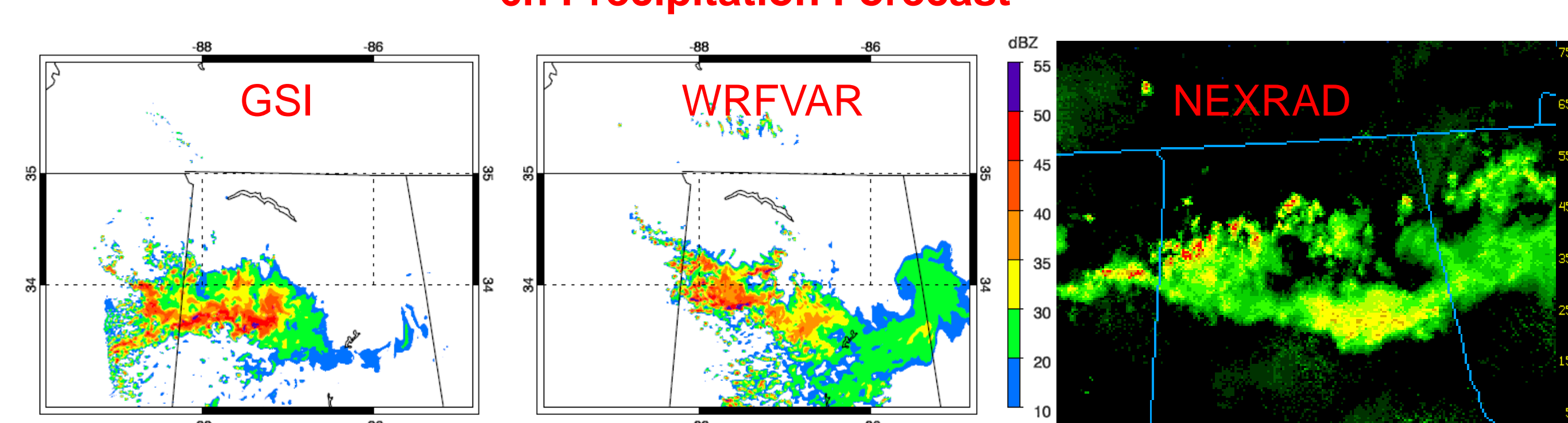
Analysis: Z_H at 0600 UTC 2 September 2013



Analysis: Moisture at low level



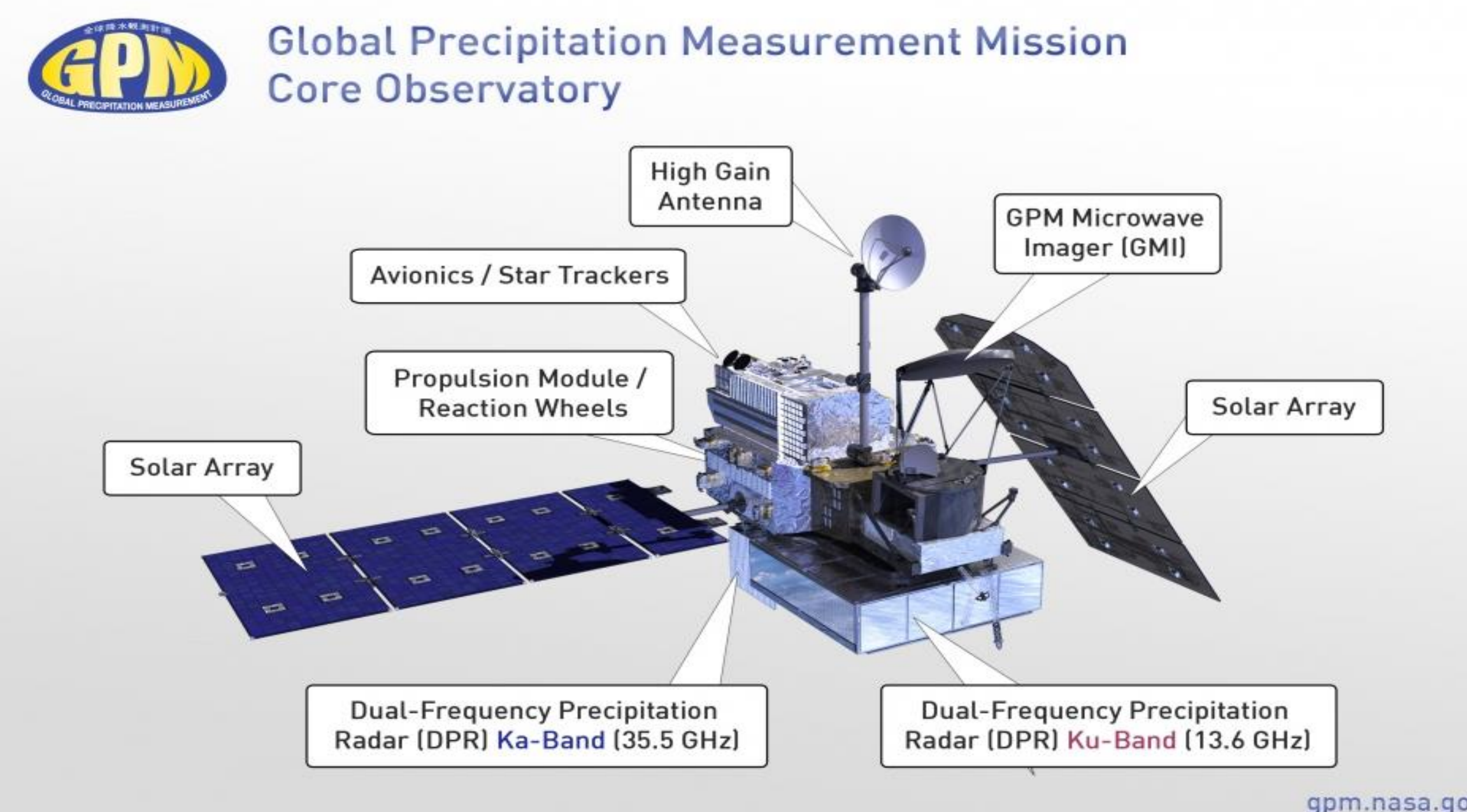
6h Precipitation Forecast



Conclusion & Discussion:

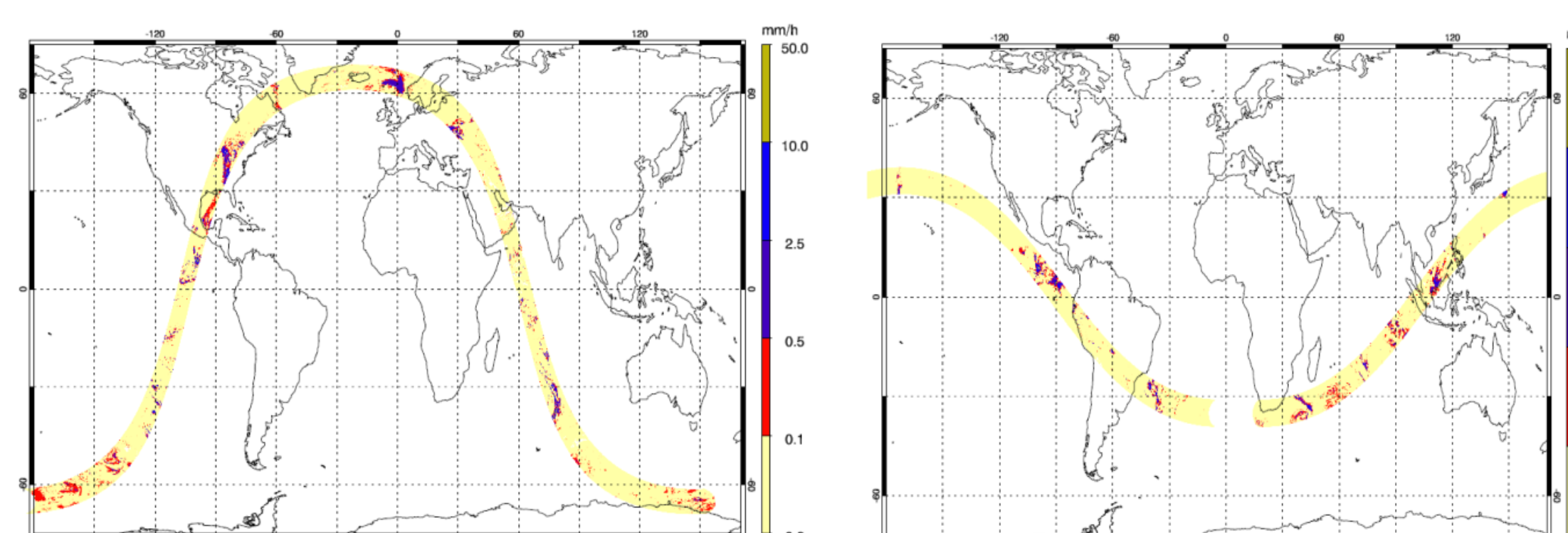
1. Z_H , Z_{DR} , and V_r data from wsr-88D radar have been successfully assimilated with GSI system. Impact from the dual-polarimetric radar variables has been found on hydrometeor and thermodynamic fields.
2. Difference has been found in analysis fields between GSI and WRFVAR reflects various assimilation procedures and implies the need for further studies and improvement in GSI radar assimilation.

GPM GMI Rainrate Data Assimilation



Motivation:

- GPM is Built upon TRMM legacy for next-generation global observation of rain and snow.
- GPM has been launched and DPR and GMI data is available now.
- Broader coverage ~70S – 70 N.
- Ka/Ku dual-frequency radar and 13-channel Microwave Imager: Better retrieval for light rain and snowfall.



Project Goals:

- To develop methodology to implement GPM DPR and GMI data with GSI and WRF model
- To investigate the potential and value GPM observation into NWP for operational environment.

Model and Data Assimilation System:

WRF ARW V3.5.1

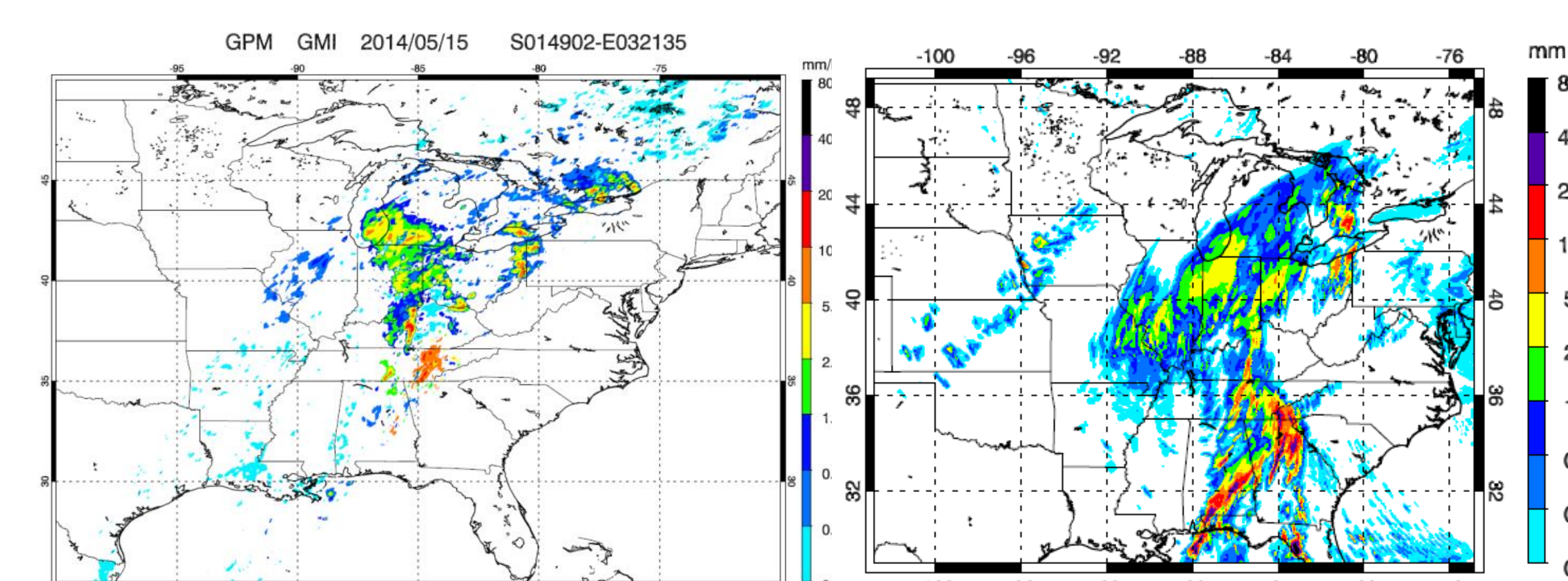
Community GSI v3.3

Experiments:

Case study: 2014-05-15 heavy rainfall event
 Data: GMI 2AGPORF rainrate

GMI 2AGPORF rainrate

WRF rainrate at 0200 UTC



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